

CLAIMS

1. A sensor assembly comprising:
 - a transducer configured to sense an environmental characteristic;
 - a memory element coupled to the transducer and configured to store a plurality of transducer signatures; and
 - 5 a processor coupled to the memory and configured to store an adaptive algorithm, to identify the transducer using the transducer signatures, to process the environmental characteristic using the identified transducer signatures and the adaptive algorithm, and to output the processed environmental characteristics.
- 10 2. The sensor assembly of claim 1, and wherein the transducer signatures comprise a transducer calibration parameter.
3. The sensor assembly of claim 1, and wherein the transducer signatures comprise a transducer temperature compensation parameter.
- 15 4. The sensor assembly of claim 1, further comprising a reporting device coupled to the processor and configured to receive and report the processed environmental characteristics from the processor.
5. The sensor assembly of claim 4, and wherein the processor automatically identifies the reporting device, and automatically adjusts the processed environmental characteristics based on the identified reporting device.
- 20 6. The sensor assembly of claim 4, and wherein the reporting device comprises at least one of a local display, a personal computer ("PC"), an industrial programmable logic controller ("PLC"), a telemetry system, and a data logging system.

7. The sensor assembly of claim 1, further comprising a transducer preamplifier coupled to the transducer, and configured to amplify the sensed environmental characteristic.

8. The sensor assembly of claim 1, and wherein the processor repeatedly and automatically detects to identify the transducer.

9. The sensor assembly of claim 1, and wherein the processor chooses an adaptive algorithm based on the transducer signatures of the identified transducer.

10. The sensor assembly of claim 1, further comprising at least one signal converter coupled to the transducer and configured to convert the sensed environmental characteristic to a desired output format.

11. The sensor assembly of claim 10, and wherein the at least one signal converter comprises a sigma-delta analog-to-digital converter, and wherein the desired output format comprises digital data.

12. The sensor assembly of claim 1, and wherein the processor calibrates the environmental characteristic with the identified transducer signatures and the adaptive algorithm.

13. The sensor assembly of claim 1, and wherein the transducer comprises at least one of a local data display and a keypad, a personal computer ("PC") communication cable, a programmable logic controller ("PLC") communication cable, a telemetry device, a multi-sensor adapter device, and a data storage device.

14. The sensor assembly of claim 1, further comprising a transducer housing configured to house the transducer and the memory, and a body housing configured to house the processor and coupled to the transducer housing.

15. The sensor assembly of claim 1, further comprising a housing configured to house the transducer, the memory, and the processor.

16. A sensor assembly comprising:

a sensing head having a transducer configured to sense an environmental characteristic, and a memory element coupled to the transducer and configured to store a plurality of transducer signatures; and

5 an adapting body coupled to the sensing head, to receive the transducer signatures and the environmental characteristic from the sensing head, the adapting body having a processor configured to store an adaptive algorithm, to identify the transducer using the transducer signatures, and to process the environmental characteristics using the identified transducer signatures and the adaptive algorithm to
10 generate an output representative of the environmental characteristic.

17. The sensor assembly of claim 16, and wherein the transducer signatures comprise a transducer calibration parameter.

18. The sensor assembly of claim 16, and wherein the transducer signatures comprise a transducer temperature compensation parameter.

15 19. The sensor assembly of claim 16, further comprising a reporting device coupled to the processor and configured to receive and report the output from the processor.

20. The sensor assembly of claim 19, and wherein the processor automatically identifies the reporting device, and automatically adjusts the output
20 based on the identified reporting device.

21. The sensor assembly of claim 19, and wherein the reporting device comprises at least one of a local display, a personal computer ("PC"), an industrial programmable logic controller ("PLC"), a telemetry system, and a data logging system.

22. The sensor assembly of claim 16, further comprising a transducer preamplifier coupled to the transducer, and configured to amplify the sensed environmental characteristic.

5 23. The sensor assembly of claim 16, and wherein the processor repeatedly and automatically detects to identify the transducer.

24. The sensor assembly of claim 16, and wherein the processor chooses an adaptive algorithm based on the transducer signatures of the identified transducer.

10 25. The sensor assembly of claim 16, further comprising at least one signal converter coupled to the transducer and configured to convert the sensed environmental characteristic to a desired output format.

26. The sensor assembly of claim 25, and wherein the at least one signal converter comprises a sigma-delta analog-to-digital converter, and wherein the desired output format comprises digital data.

15 27. The sensor assembly of claim 16, and wherein the processor calibrates the environmental characteristic with the identified transducer signatures and the adaptive algorithm.

20 28. The sensor assembly of claim 16, and wherein the transducer comprises at least one of a local data display and a keypad, a personal computer ("PC") communication cable, a programmable logic controller ("PLC") communication cable, a telemetry device, a multi-sensor adapter device, and a data storage device.

29. A method of sensing an environmental characteristic with a transducer assembly, wherein a transducer head is coupled to a transducer body, the transducer head has a memory, and the transducer body has a processor, the method comprising:

retrieving a plurality of transducer signatures from the memory;

5 processing the transducer signatures to identify the transducer at the processor;

sensing an environmental characteristic using the transducer;

conditioning the environmental characteristic using the processor with an adaptive firmware stored in the transducer body; and

outputting the conditioned environmental characteristics.

10 30. The method of claim 29, and wherein the transducer signatures comprise a transducer calibration parameter.

31. The method of claim 29, and wherein the transducer signatures comprise a transducer temperature compensation parameter.

15 32. The method of claim 29, and wherein outputting the conditioned environmental characteristics further comprises:

coupling the transducer body to a reporting device; and

reporting the conditioned environmental characteristics on the reporting device.

33. The method of claim 32, further comprising:

20 automatically identifying the reporting device; and

automatically adjusting the conditioned environmental characteristics based on the identified reporting device.

34. The method of claim 32, and wherein the reporting device comprises at least one of a local display, a personal computer ("PC"), an industrial programmable logic controller ("PLC"), a telemetry system, and a data logging system.

5 35. The method of claim 29, further comprising amplifying the environmental characteristic.

36. The method of claim 29, wherein processing the transducer signatures to identify the transducer at the processor further comprises repeatedly and automatically detecting to identify the transducer.

10 37. The method of claim 29, further comprising choosing an adaptive algorithm based on the transducer signatures of the identified transducer.

38. The method of claim 29, wherein outputting the conditioned environmental characteristics further comprises formatting the environmental characteristic.

15 39. The method of claim 38, further comprising sigma-delta analog-to-digitally converting the environmental characteristic.

40. The method of claim 29, wherein conditioning the environmental characteristic using the processor further comprises calibrating the environmental characteristic.

20 41. The method of claim 29, and wherein the transducer body comprises at least one of a local data display and a keypad, a personal computer ("PC") communication cable, a programmable logic controller ("PLC") communication cable, a telemetry device, a multi-sensor adapter device, and a data storage device.